

Water diffusivity in model biological membranes

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Abstract

Water self-diffusion was studied in model biological membranes (lipid bilayers of dioleoylphosphatidylcholine (DOPC) and dimyristoylphosphatidylcholine) by nuclear magnetic resonance with pulsed field gradient. The results for DOPC-water bilayers for three different orientations of the angle θ between the direction of the field gradient and the normal to the bilayer ($\theta = 57.4, 90, 0^\circ$) were presented. The differences in the diffusion decay shapes and values of the diffusion coefficients, obtained at different bilayer orientations and demonstrating highly anisotropic diffusion of the interbilayer water was discussed. This study also has shown some features of water diffusion in model lipid bilayers at the concentrations corresponding to the presence of bound and quasi-free water. The dependence of the water and lipid diffusion on the water content was considered from the point of view of the bilayers hydration and types of interbilayer water.
